

CLAIMS

1. A manufacturing process for a printed wiring board in which a copper clad laminate obtained by bonding a copper foil on resin as a substrate material is irradiated with carbon dioxide laser light to form a through hole or a hole such as IVH, BVH or the like therein and interlayer connection layer formation is performed, followed by performing circuit formation, characterized by comprising the steps of:
- forming a nickel layer as an additional metal layer of 0.08 to 2  $\mu$ m in thickness on a surface of said copper foil residing in an external layer of said copper clad laminate; irradiating a surface of said nickel layer with said laser light at a prescribed position where said through hole or said hole such as IVH, BVH or the like is to be formed in said copper clad laminate to thereby remove said nickel layer, said copper foil and said resin layer as a substrate material simultaneously into a desired shape;
- using an etching method and a physical polishing method, singly or in combination, to remove said nickel layer as a surface layer of said copper clad laminate after the laser drilling;
- performing interlayer connection layer formation to obtain interlayer connection in said copper clad laminate from which said nickel layer is removed; and
- forming an etching resist layer on a surface of said copper clad laminate after copper plating, followed by

exposure, development, circuit etching, and etching resist removal.

2. A manufacturing process for a printed wiring board in which a copper clad laminate obtained by bonding a copper foil on resin as a substrate material is irradiated with carbon dioxide laser light to form a through hole or a hole such as IVH, BVH or the like therein and interlayer connection layer formation is performed, followed by performing circuit formation, characterized by comprising the steps of:

forming a cobalt layer as an additional metal layer of 0.05 to 3  $\mu\text{m}$  in thickness on a surface of said copper foil residing in an external layer of said copper clad laminate;

irradiating a surface of said cobalt layer with said laser light at a prescribed position where said through hole or said hole such as IVH, BVH or the like is to be formed in said copper clad laminate to thereby remove said cobalt layer, said copper foil and said resin layer as a substrate material simultaneously into a desired shape;

using an etching method and a physical polishing method, singly or in combination, to remove said cobalt layer as a surface layer of said copper clad laminate after the laser drilling;

performing interlayer connection layer formation to obtain interlayer connection in said copper clad laminate from which said cobalt layer is removed; and

forming an etching resist layer on a surface of said copper clad laminate after copper plating, followed by

exposure, development, circuit etching, and etching resist removal.

3. A manufacturing process for a printed wiring board in  
5 which a copper clad laminate obtained by bonding a copper foil  
on resin as a substrate material is irradiated with carbon  
dioxide laser light to form a through hole or a hole such as  
IVH, BVH or the like therein and interlayer connection layer  
formation is performed, followed by performing circuit  
10 formation, characterized by comprising the steps of:

forming a zinc layer as an additional metal layer of 0.03  
to 2  $\mu\text{m}$  in thickness on a surface of said copper foil residing  
in an external layer of said copper clad laminate;

15 irradiating a surface of said zinc layer with said laser  
light at a prescribed position where said through hole or said  
hole such as IVH, BVH or the like is to be formed in said copper  
clad laminate to thereby remove said zinc layer, said copper  
foil and said resin layer as a substrate material  
simultaneously into a desired shape;

20 using an etching method and a physical polishing method,  
singly or in combination, to remove said zinc layer as a  
surface layer of said copper clad laminate after the laser  
drilling;

performing interlayer connection layer formation to  
25 obtain interlayer connection in said copper clad laminate  
from which said zinc layer is removed; and

forming an etching resist layer on a surface of said  
copper clad laminate after copper plating, followed by

exposure, developm nt, circuit etching, and etching resist removal.

4. The manufacturing process for a printed wiring board according to claim 1, characterized in that an etching solution for use in dissolution of said nickel layer is a selective etching solution not dissolving copper and one of the following solutions is used as said etching solution:

(1) a sulfuric acid solution containing sulfuric acid of 550 ml/l to 650 ml/l in a concentration;

(2) a mixed acid solution of sulfuric acid and nitric acid; and

(3) a mixed solution of sulfuric acid, m-nitrobenzenesulfonic acid.

5. A manufacturing process for a printed wiring board in which a copper clad laminate obtained by bonding a copper foil on resin as a substrate material is irradiated with carbon dioxide laser light to form a through hole or a hole such as IVH, BVH or the like therein and interlayer connection layer formation is performed, followed by performing circuit formation, characterized by comprising the steps of:

forming an organic layer on a surface of said copper foil residing in an external layer of said copper clad laminate;

forming a nickel layer as an additional metal layer of 0.08 to 2  $\mu$ m in thickness on a surface of said organic layer;

irradiating a surface of said nickel layer with said laser light at a prescribed position where said through hole

or said hole such as IVH, BVH or the like is to be formed in said copper clad laminate to thereby remove said nickel layer, said organic layer, said copper foil and said resin layer as a substrate material simultaneously into a desired shape;

5 removing said nickel layer from a surface of said copper clad laminate by peeling;

performing interlayer connection layer formation to obtain interlayer connection in the copper clad laminate; and

10 forming an etching resist layer on said surface of said copper clad laminate after copper plating, followed by exposure, development, circuit etching, and etching resist removal.

6. A manufacturing process for a printed wiring board in which a copper clad laminate obtained by bonding a copper foil on resin as a substrate material is irradiated with carbon dioxide laser light to form a through hole or a hole such as IVH, BVH or the like therein and interlayer connection layer formation is performed, followed by performing circuit formation, characterized by comprising the steps of:

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forming an organic layer on a surface of said copper foil residing in an external layer of said copper clad laminate;

forming a cobalt layer as an additional metal layer of 0.05 to 3  $\mu\text{m}$  in thickness on a surface of said organic layer;

25 irradiating a surface of said cobalt layer with said laser light at a prescribed position where said through hole or said hole such as IVH, BVH or the like is to be formed in said copper clad laminate to thereby remove said cobalt layer,

said organic layer, said copper foil and said resin layer as a substrate material simultaneously into a desired shape;

removing said cobalt layer from a surface of said copper clad laminate by peeling;

5 performing interlayer connection layer formation to obtain interlayer connection in the copper clad laminate; and

forming an etching resist layer on said surface of said copper clad laminate after copper plating, followed by exposure, development, circuit etching, and etching resist removal.

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7. A manufacturing process for a printed wiring board in which a copper clad laminate obtained by bonding a copper foil on resin as a substrate material is irradiated with carbon dioxide laser light to form a through hole or a hole such as IVH, BVH or the like therein and interlayer connection layer formation is performed, followed by performing circuit formation, characterized by comprising the steps of:

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forming an organic layer on a surface of a copper foil residing in an external layer of said copper clad laminate;

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forming a nickel layer as an additional metal layer of 0.08 to 2  $\mu\text{m}$  in thickness on a surface of said organic layer;

irradiating a surface of said nickel layer with said laser light at a prescribed position where said through hole

25 or said hole such as IVH, BVH or the like is to be formed in said copper clad laminate to thereby remove said nickel layer, said organic layer, said copper foil and said resin layer as a substrate material simultaneously into a desired shape;

performing interlayer connection layer formation to obtain interlayer connection in said copper clad laminate; removing said nickel layer from a surface of said copper clad laminate by peeling; and

5 forming an etching resist layer on said surface of said copper clad laminate after removal of said nickel layer, followed by exposure, development, circuit etching, and etching resist removal.

10 8. A manufacturing process for a printed wiring board in which a copper clad laminate obtained by bonding a copper foil on resin as a substrate material is irradiated with carbon dioxide laser light to form a through hole or a hole such as IVH, BVH or the like therein and interlayer connection layer formation is performed, followed by performing circuit formation, characterized by comprising the steps of:

forming an organic layer on a surface of a copper foil residing in an external layer of said copper clad laminate;

15 forming a cobalt layer as an additional metal layer of 0.05 to 3  $\mu\text{m}$  in thickness on a surface of said organic layer;

irradiating a surface of said cobalt layer with said laser light at a prescribed position where said through hole or said hole such as IVH, BVH or the like is to be formed in said copper clad laminate thereby to remove said cobalt layer, 20 said organic layer, said copper foil and said resin layer as a substrate material simultaneously into a desired shape;

performing interlayer connection layer formation to obtain interlayer connection in said copper clad laminate;

removing said cobalt layer from a surface of said copper clad laminate by peeling; and

forming an etching resist layer on said surface of said copper clad laminate after removal of said cobalt layer,  
5 followed by exposure, development, circuit etching, and etching resist removal.

10 9. The manufacturing process for a printed wiring board according to any of claims 5 to 8, characterized in that said organic layer is formed with one or two selected from the group consisting of nitrogen-containing organic compounds, sulfur-containing organic compounds and carboxylic acids.

15 10. The manufacturing process for a printed wiring board according to any of claims 5 to 8, characterized in that said organic layer is formed by repeatedly applying an organic agent constituted of one or constituted as a mixture of two or more selected from the group consisting of nitrogen-containing organic compounds, sulfur-containing organic  
20 compounds and carboxylic acids several times.

25 11. The manufacturing process for a printed wiring board according to any of claims 5 to 8, characterized in that said organic layer is formed by alternately applying two organic agents or more selected from the group consisting of nitrogen-containing organic compounds, sulfur-containing organic compounds and carboxylic acids several time.